

## **REMARKS/ARGUMENTS**

### **The Status of the Claims.**

Claims 1-10, 12-13 and 16-42 are pending with entry of this amendment, claims 11, 14, 15 and 43-67 being cancelled and claims 1, 12, 13 and 15 being amended herein. These amendments introduce no new matter and support is replete throughout the specification. These amendments are made without prejudice and are not to be construed as abandonment of the previously claimed subject matter or agreement with any objection or rejection of record.

Claims 11, 14, 15 and 43-67 have been cancelled; cancellation of these claims is without prejudice, without intent to abandon any originally-claimed subject matter, and without intent to acquiesce in any rejection of record. Applicants expressly reserve the right to file one or more continuing applications containing these cancelled claims.

Applicants submit that no new matter has been added to the application by way of the above Amendment. Accordingly, entry of the Amendment is respectfully requested.

### **The Election/Restriction Requirement.**

Applicants cancel claims 43-67 with entry of this amendment. Please note, however, that Applicants reserve the right to file subsequent applications claiming the canceled subject matter and the claim cancellations should not be construed as abandonment or agreement with the Examiner's position in the Office Action.

### **The Information Disclosure Statement.**

Applicants note with appreciation the Examiner's thorough consideration of the references cited in the Information Disclosure Statement (Form 1449) submitted on February 13, 2004; July 1, 2004; and August 12, 2005.

**35 U.S.C. §102.**

**The claims are novel over USPN 6,882,051 to Majumdar et al.**

Claims 1-6, 8-12, 31 and 37-42 were rejected under 35 U.S.C. §102(b) as allegedly anticipated by USPN 6,882,051 to Majumdar et al. Applicants traverse.

In order for a reference to anticipate an invention, the reference must teach each and every element of the claimed invention. Claims 1-6 and 8-12 are drawn to compositions comprising a plurality of structurally ordered nanostructures in a matrix. The matrix comprises one or more components that are chemically cross-linked, or capable of chemically cross-linking, to one or more of the nanostructures. The matrix components interact to form a plurality of receiving structures capable of accommodating the nanostructures; these receiving structures have a desired ordering and/or a desired orientation, giving rise to the plurality of structurally ordered nanostructures. Claim 31 is drawn to compositions comprising a plurality of structurally ordered spherical, ovoid, elongated or branched nanostructures in which one or more alignment ligands associated with the member nanostructures interact to structurally order the plurality of nanostructures. Claims 37-42 are drawn to pluralities of clusters of structurally ordered nanostructures on a substrate.

Majumdar is alleged to teach or describe elongated structurally-oriented nanowires in a matrix as depicted in Figure 30. However, Applicants respectfully disagree that the nanowire constructs prepared by the methods described in Majumdar are actually structurally ordered nanostructures as claimed in the subject invention. According to the publication, "nanowire arrays can be easily embedded in a polymer matrix by flowing a polymer solution after the nanowires are fabricated, and then curing [the matrix]" to form the nanowire arrays (column 25, lines 8-11). However, the publication does not teach or describe chemical crosslinking of matrix components to the nanostructure, or the use of alignment ligands to structurally order the plurality of nanostructures, nor does the publication teach or describe the use of matrix components that interact to form a plurality of receiving structures capable of accommodating the nanostructures.

As noted above, in order for to anticipate an invention, a reference must teach each and every element of the claimed invention. Since Majumdar does not teach every

element of the claimed invention, Applicants submit that the rejection is improper and respectfully request that it be withdrawn.

**35 U.S.C. §103(a)**

**The claims are patentable over Majumdar and USPN 6,983,093**

Claims 13-28 and 30-36 were rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Majumdar in light of USPN 6,983,093 ("Pinnavaia"). Majumdar is alleged to teach structurally-oriented nanowires in a matrix. Pinnavaia is alleged to teach compositions similar to those of Majumdar ("similar type composition as the primary reference with this aspect"). The Examiner alleges that it would have been obvious to one of ordinary skill in the art to combine the teachings of these two references to produce the claimed embodiments. Applicants traverse.

Three requirements must be met for a *prima facie* case of obviousness. First, the prior art reference must teach all of the limitations of the claims (MPEP §2143.03). Second, there must be a motivation to modify the reference or combine the teachings to produce the claimed invention (MPEP §2143.01). Third, a reasonable expectation of success is required (MPEP §2143.02). The teaching or suggestion to combine and the expectation of success must be both found in the prior art and not based on Applicants' disclosure (MPEP §2143). The cited publications, alone or in combination, do not meet these criteria.

The rejected claims are drawn to various embodiments of the pluralities of structurally ordered nanostructures in a matrix directed to chemically-crosslinked components (claims 13-15); multiple matrix layers (claims 16-18); and first and second alignment members (claims 19-36). As a first point, the cited publications do not teach or disclose all of the limitations of the claimed invention. As noted by the Examiner, Majumdar does not teach or describe aspects of the claimed composition involving functional groups for interacting or cross-linking. USPN 6,983,093 does not remedy any of these deficits.

Applicants note that USPN 6,983,093 (the '093 patent) is a patent to Fraval and Brinker, not Pinnavaia as indicated in the Action. The '093 patent is drawn to fluid light guides having a hydrophobic aerogel cladding layer. Column 7, lines 18-43 of the publication (as cited by the Examiner) describes the hydrophilic characteristics of aerogels in general, and the need for hydrophobic aerogels for use in cladding. The '093 patent does not

teach or disclose compositions comprising a plurality of structurally ordered nanostructures in a matrix; rather, this publication does not appear to teach or describe nanostructures at all. Applicants request further clarification as to how the '093 publication teaches or discloses "similar types composition as the primary reference with this aspect" as alleged by the Examiner.

Since Majumdar does not teach or describe compositions comprising a plurality of structurally ordered nanostructures in a matrix having components that are chemically cross-linked or capable of chemically cross-linking to the nanostructures, in which the matrix components interact to form a plurality of receiving structures that provide ordering and/or orientation of the nanostructures, and the '093 patent does not remedy these deficits, the first requirement for proving a *prima facie* case of obviousness has not been met.

When a rejection depends on a combination of prior art references, there must be some teaching, suggestion or motivation to combine the references (*In re Geiger*, 815 USPQ2s 1276, 1278 (Fed. Cir. 1987)). The cited references must additionally provide a reasonable expectation of success (*In re Vaeck*, 20 USPQ2d 1438 (Fed. Cir. 1991)), and both the motivation to combine and the expectation of success must be found in the prior art (rather than based on Applicants' disclosure or other hindsight). The Examiner has failed to provide a motivation based upon the cited art to combine the Majumdar nanowires with the aerogel compositions to the '093 patent. Furthermore, there is no indication in the art that combining these aerogels with the Majumdar nanowires would have successfully produced the claimed plurality of structurally ordered nanostructures in a matrix. Applicants submit that one of skill in the art would not expect to successfully produce the claimed invention using the hydrophobic aerogels disclosed in the '093 patent, since these hydrogels were specifically designed to not have structured/oriented pores, since such structures would reduce the water-repelling characteristics needed for the claimed cladding (see column 7, lines 14-27).

Given that the cited art (alone or in combination) do not teach or disclose the limitations of the claimed invention, there is no motivation for one of skill in the art to combine the references, and there is no reasonable expectation of successfully producing the

claimed invention upon combination of these references, Applicants respectfully submit that the rejection is improper and request that it be withdrawn.

**The claims are patentable over Majumdar, USPN 6,983,093 and Ying**

Claims 19-28, 30, 32, 33 and 36 were rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Majumdar and Pinnavaia in further view of Ying et al. (USPN 5,958,367). Applicants traverse.

As noted above, three requirements must be met for a *prima facie* case of obviousness. Specifically, a *prima facie* case of obviousness requires that the combination of the cited art, taken with the general knowledge in the field, must provide all of the elements of the claimed invention. Neither Majumdar nor the '093 patent teach or describe plurality of structurally ordered nanostructures in a matrix comprising one or more components that are chemically cross-linked or capable of chemically cross-linking to one or more of the nanostructures, wherein the one or more matrix components interact to form a plurality of receiving structures capable of accommodating and providing ordering and/or orientation of the nanostructures. Ying does not remedy this deficit.

Ying is alleged to teach that "it is known in the art to include ligand members on combinations." Ying et al. is drawn to compositions and methods for producing hexagonally-packed mesoporous metal oxides. The methods allegedly employ a surfactant with a head group that interacts with a metal oxide precursor (column 2, lines 64-67) which is then removed from the hexagonally packed mesostructures (column 3, lines 6-7 and lines 24-26). Applicants note that mesoporous metal oxides are *not* synonymous with nanostructures. Furthermore, the Ying compositions do not include a matrix component. The Action does not indicate where Ying discloses nanostructures and matrix components for chemically cross-linking to the nanostructures. Since the cited publication, alone or in combination with Majumdar and the '093 patent, does not teach or describe the limitations of the claimed invention, the first requirement for proving a *prima facie* case of obviousness has not been met.

As noted previously, a *prima facie* case for obviousness must also include some teaching, suggestion or motivation to combine the references, and a reasonable

expectation of success of producing the claimed invention upon combining the references. The Action does not provide how the cited publications meet either of these criteria. Ying does not teach or describe matrices, and the '093 aerogels (which were specifically designed to not have structured/oriented pores) are not suitable for use in ordering and/or orienting nanostructures. Applicants submit that there is no motivation to combine these references, and even less expectation of successfully producing the claimed invention.

Applicants maintain that the claimed invention is not rendered unpatentable over Majumdar, the '093 patent, and Ying, because the cited references in combination do not teach the limitations of the claims, there is no motivation to combine the cited references, and there would not have been a reasonable expectation of successfully combining these references to achieve the claimed compositions. Since the rejection is improper, Applicants respectfully request that it be withdrawn.

### CONCLUSION

In view of the foregoing, Applicants believes all claims now pending in this application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

**If the claims are deemed not to be in condition for allowance after consideration of this Response, a telephone interview with the Examiner is hereby requested. Please telephone the undersigned at (510) 337-7871 to schedule an interview.**

QUINE INTELLECTUAL PROPERTY LAW GROUP  
P.O. BOX 458, Alameda, CA 94501  
Tel: 510 337-7871  
Fax: 510 337-7877  
PTO Customer No.: **22798**  
Deposit Account No.: **50-0893**

Respectfully submitted,



Angela P. Horne, Ph.D.  
Reg. No: 41,079

Attachments:

- 1) A petition to extend the period of response for 1 month;
- 2) A transmittal sheet;
- 3) A fee transmittal sheet; and,
- 4) A receipt indication postcard.